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STAINED-GLASS WINDOW
By Louis J. Millet

AMERICAN ART INDUSTRIES—III

STAINED-GLASS WORK

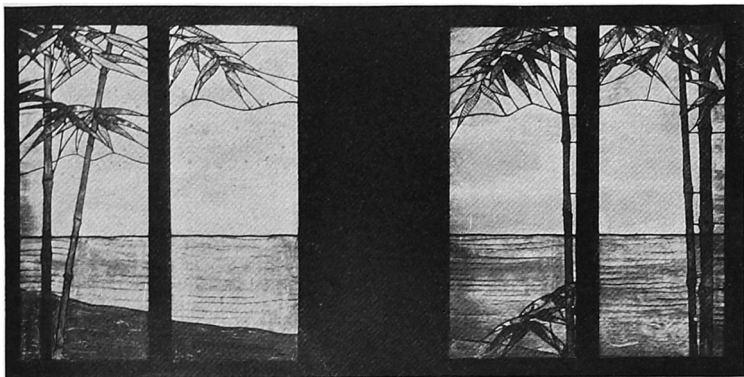
Decorative art has undergone many and radical changes in the last decade or so, and in none of its branches has the improvement been more marked than in stained-glass work. The art that glorified the cathedrals of the Middle Ages and sank in later years to a state bordering on degradation has literally had a renaissance. For this revival Americans are largely responsible. They were indebted to foreigners, it is true, for their start in the art, but they have excelled their teachers and the best exemplars of stained-glass work in the old world to-day would feel it a privilege to take lessons from a Tiffany or a La Farge.

It was Americans who broadened the art and first showed it possible successfully to treat other subjects than conventionalized saints with stoles and halos. They introduced the most charming bits of design, and even pleasing landscapes, as correct and rich in coloring as a finished oil-painting. To Americans also are due the invention and use of opal glass, now generally employed in the best work. Through American inventiveness, likewise, the heavy lead joints of old-time work are being supplanted by almost imperceptible copper joints in which galvanic action is made to take its part in uniting innumerable pieces of pot-metal color into a single sheet, practically as rigid and strong as a pane of plate-glass. These achievements have all been effected in less than a generation.

Less than two decades ago there were only eighteen makers of stained glass in the United States, and the output of their establishments was of the cheapest and most bizarre character. The method

of enameling the glass to produce desired effects was the one most commonly employed. The colors used were weak and crude, and through poverty of taste or pooriness of material there was an utter absence of those rich color harmonies for which the windows in Mediæval structures were famous.

The designs, moreover, were as crude as the workmanship, the heavy lead lines running in such a way as to chop up the designs and give the windows the effect of patchwork rather than of an integral

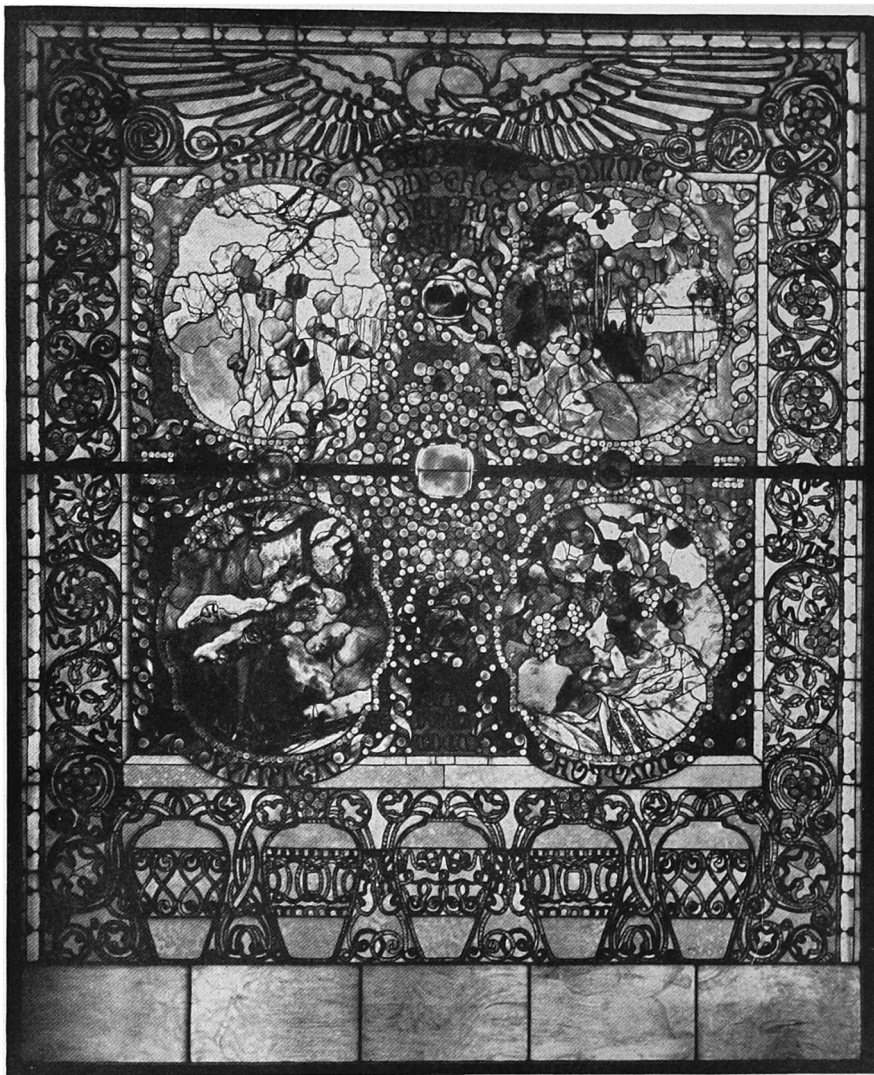


WINDOW DESIGN
By George R. Dean

and symmetrical whole. In a word, as late as the eighties, when some efforts were being made in France and England to restore stained-glass work to its true principles, not a word of praise could be said of the product of America. Yet to-day the average stained-glass window in this country is fully equal to the corresponding grade of work in the Old World, and many of our best edifices can boast of windows which in beauty of design and harmony of coloring have scarcely an equal.

The development of stained-glass work in recent years is unique in this, that while in most of the industrial arts the progress has been due to the development of science and the inauguration of new methods, the improvement in this art has been due to a reversion to the old methods that obtained when stained glass was in its infancy. A word of explanation will make clear the underlying causes.

The rich, mellow stained-glass windows of Mediæval times, which have been the admiration of the ages, are for the most part of comparatively small extent, a peculiarity enforced by the prevailing heavy style of architecture. The early workers in the art, moreover, used



THE SEASONS, WINDOW DESIGN
By Louis C. Tiffany

exclusively glass of different colors in working out their designs. They scarcely knew the use of enamel or mineral paint, and the results they obtained were attributable solely to a well-developed color sense which impelled them to make a careful selection of different colored glass and arrange the carefully cut pieces so as to produce a harmonious blending of shades.



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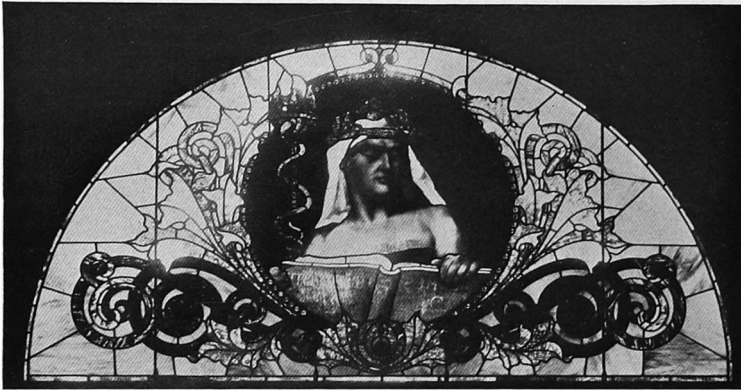
Their work, therefore, was of genuine stained. The material with which they worked was full of defects as regards texture and surface, but they did have the art of manufacturing a magnificent red and some blues that to-day probably have no equal. They had also good purples and greens and some smoky and inferior yellows. In every case the color material was fused into the glass, with the result that the colors produced were deeper and richer than those produced in later days by coating or enameling the surface of white glass with colored pigment.

The two great charms, therefore, of Mediæval stained-glass work were the genuineness of the coloring—colored glass, not painted glass—and the irregular, imperfect form in which the material came into the hands of the designer and practical worker.

The first lapse from the high standard of these early stained-glass workers was due to a revolution of architectural methods. As builders used lighter material in construction, they left wider spaces in their walls to be filled with glass, and the costliness of the genuine pot-metal formerly used was doubtless one of the principal reasons why the genuine article was gradually abandoned in favor of a lighter and

cheaper grade of uncolored glass painted or enameled so as to give approximately the effect of the colored glass formerly used. From this first measure in the interest of economy it was but a short and easy step to the painting of figures and designs which were fired into the glass.

As a direct consequence of the discovery and use of enamels,



STAINED-GLASS WINDOW

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stained-glass work as early as the sixteenth century lost its proper decorative and structural functions. Windows were no longer windows—they were paintings which obscured the light from without and reflected the light from within. In a sense it was a transference of the frescos from the walls of a structure to its windows, where the sickly, inharmonious colors became an eyesore rather than an addition to legitimate decoration. The rich, warm pot-metal colors of a former day fell into almost utter disuse.

The revival of the art of stained-glass-making sprang from recognition that to equal the magnificent windows of the earliest times, it was necessary to revert to ancient methods and to employ something comparable with ancient material. This conviction became general in France, England, and Germany at about the same time, but it was not until years later that the principle was recognized in America. When once, however, the idea found acceptance among American workers, the improvement in the art was so marked and so rapid as easily to give Americans the rank of leaders.

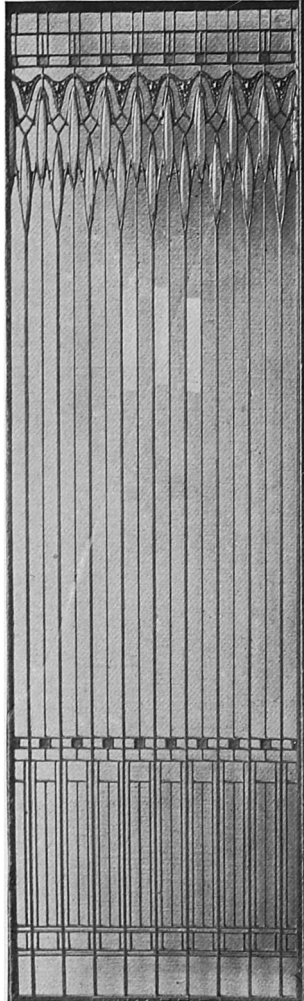
All sorts of experiments were made with different materials, and the trend of all these experiments was away from the painted

or enameled glass of the later Mediæval period back to the rough but genuine colored glass of earlier days. As a result it was not long before certain manufacturers of glass in America were producing finer pot-metal colors than were turned out in the Old World. Indeed, it was only a few years after these first experiments were made when American manufacturers were producing pot-metal, as the peculiar kind of glass used in making ornamental windows is called, equal in thickness, texture, and color to the best product of the twelfth century.

Conspicuous among the leaders in the revival of legitimate stained-glass work were Louis C. Tiffany and John La Farge, and to the latter the world owes the discovery or invention of opal glass, which has rightly been termed the most important contribution of later ages to stained-glass work. The use of this peculiar glass is largely a matter of accident.

Mr. La Farge, while engaged on a window in which he was using thin slices of onyx and other so-called semiprecious stones, found a piece of opal glass which by chance had been produced at one of the factories, and which he thought could be used as a substitute for the onyx. His first efforts to induce the glassmakers to produce some of it for him in panes failed, but he experienced such difficulty in getting the richness of tone he desired that he kept on persistently experimenting with opal glass until he produced a material unrivaled in texture and in the richness of its effects.

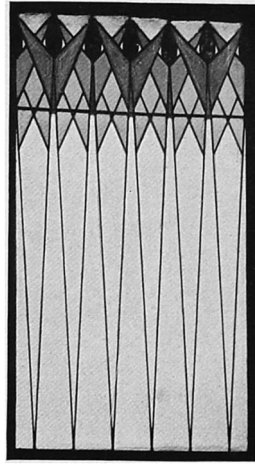
Opal glass is essentially the same material as the opaque white glass commonly known as fusible porcelain. Its coloring matters are phosphate of lime, peroxide of tin, or arsenic, the arsenic imparting the prevailing yel-



SIMPLE DESIGN IN GLASS
By Frank L. Wright

low or orange tinge which gives the opal glass its name. According as the ingredients are evenly or unevenly mixed in the melting-pot, subjected to even or uneven pressure, corrugated or otherwise manipulated, the glass varies in its effect in the most surprising manner. Almost every color can be produced, but in all there is the pronounced or latent yellow tone imparted by the arsenic, and comparable with the yellow stain or enamel so highly prized in the later Mediæval days of ornamental stained-glass work.

"The best which can be done with drawings and description combined," says a specialist in stained-glass work, "must fail to convey an adequate idea to those who have not seen its many artistic qualities. Some of the effects produced in



SIMPLE DESIGN IN GLASS
By George R. Dean



WINDOW DESIGN
By Louis J. Millet

the melting-pot are extremely curious, and even picturesque. A piece of sprinkled glass may, for instance, show a very suggestive storm scene, a mass of wind-swept twigs and branches in dark brown, the emerald leaves torn from them filling the sky, which, with its flying, shapeless clouds, is represented by the murky foundation.

"Another variety of the glass is of a dark sea-green, through which play long fibers of red, which seem to sway up and down like seaweed in the wave with the undulations of the rough surface. In this the red fibers are developed by heat to any length and degree of complexity. The glass when first made is entirely



WINDOW IN "FAVRILE" GLASS

By Louis C. Tiffany

green. Glass has been made by Mr. Tiffany for special purposes over an inch in thickness; and rough-faceted glass, looking at a distance like the unpolished stones of Indian or old Gaulish jewelry, is much employed by him. It is, of course, extremely costly, but fairly solves the problem of richness."

Given the proper materials, the production of stained-glass windows—and some of them are marvels of beauty—is mainly a matter

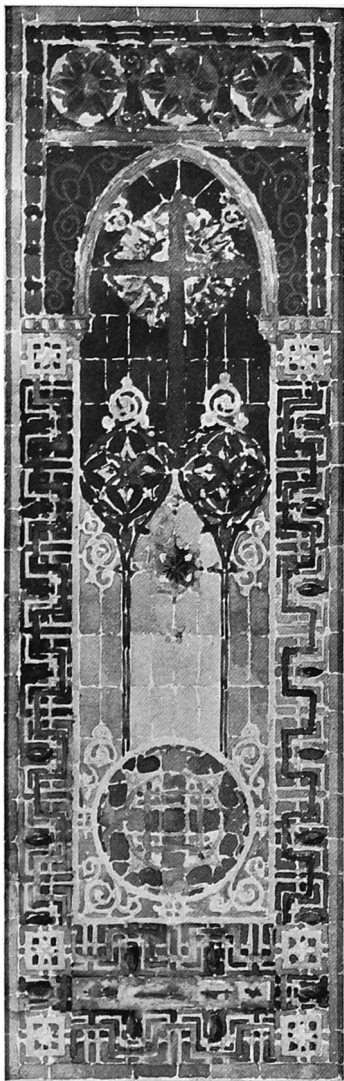
of chasteness of design and skill in the selection and manipulation of colors. It is the work of an artist, and presupposes a high degree of talent. The object is to produce a beautiful picture by light transmitted through the glass, and not by light reflected from it, as in the case of an oil-painting. The light in passing through the glass intensifies the colors, and thus the grouping of colors employed by the most skillful painter on canvas would give but a sorry effect if used by the artist in stained glass. It is indispensable that the colors be massed for harmonious effects, and this from first to last is in every piece of work largely a matter of experiment.

It is one thing to deepen a tone harmony when it is only necessary to mix paints on a palette to produce the desired result; it is quite another to take a material as uncompromising as colored glass and change its tone without the means of pigment.

The actual work of making a stained-glass window goes through various stages. First a drawing is made, care being taken to dispose of the leaded lines so that they form an integral part of the design. This drawing is colored so as to give as nearly as possible the effect of the finished window. This is by



STAINED-GLASS WINDOW
By Louis J. Millet



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way of suggestion and guide to the practical worker. Then a working drawing is made the exact size of the finished product. This furnishes the exact size of the various pieces of glass entering into the composition of the design. The rest is the work of selecting colors on the basis of the original sketch, cutting pieces according to the dimensions of the working drawing, and leading them securely together.

Some idea, therefore, can be gleaned of the difficulties of the stained-glass worker's task. From the sheets of glass at his disposal he can only, largely in an experimental way, select those pieces which tone most closely with the coloring of the sketch. In order to get the proper shadings, he cuts a piece from this sheet of glass and a piece from that, using diamond or wheel, and taking the greatest pains to cut the various pieces with absolute precision. These pieces are then put together, with a network of flanged strips of lead running between them, and are carefully soldered together. Thus step by step the whole design is pieced together.

The work up to this point is but the basis for what might be termed the artistic touches. The window thus far is little more than a patchwork of pieces of glass that may or may not blend in perfect harmony. When the window is set up so as to get the effect of transmitted light, it will be found that in some places the tones are too deep and in

some others too light. One color, it will be found, affects and radically modifies another in juxtaposition; some contrasts are too sharp and some too weak. And the artist in glasswork has before him the task of "backing up" his unfinished window in such a way as to take off all suggestion of crudity and mellow it into a rich harmonious whole.

Where a piece of glass is too strong in color, he backs it with another piece of glass light enough in tone so that when light is transmitted through it the color is weakened and softened. If the color is too weak, he backs it with a piece of glass of stronger tone, so that light transmitted through it is deepened and enriched. If one of the elaborate windows of which America can now boast of so many fine examples be examined on the outer side, it will be found literally to be a mass of protuberances and depressions, hills and valleys, so to speak, the elevated portions being securely leaded down to the first sheet of glass.

The glass of such a window therefore varies in thickness from a quarter of an inch to six or seven inches. The thick portions are nothing less than so many witnesses of the persistence and cleverness of the artist in combining various pieces of different glass in such a way that one modifies another, and the combined effect of the whole is to bring the transmitted light to the proper tone.

This, as may readily be seen, presupposes a consummate colorist on the part of the stained-glass worker. The skill of the ordinary painter is practically worthless in this class of work. Bontemps long ago said that the one thing needed for modern stained-glass work



WINDOW FOR CHURCH
By J. Alden Weir



MAGNOLIA WINDOW
Designed by Miss Northrup

was a great artist, and it is not strange, therefore, that those who have attained eminence in this peculiar work are comparatively few in number.

From what has been said of the selection and combination of different colors of glass so as to carry out a rich harmonious design, it must not be supposed that in stained-glass work of the highest order at the present time no enamels or mineral paints are used. Draperies, for instance, can usually be successfully executed by the use of colored glass only. Indeed, a special kind of glass is manufactured, called drapery glass, which is manipulated into ridges and folds to suggest the folds of a garment, the different shades which a painter produces by varying the tone of his pigments being affected by the varying thickness of the glass.

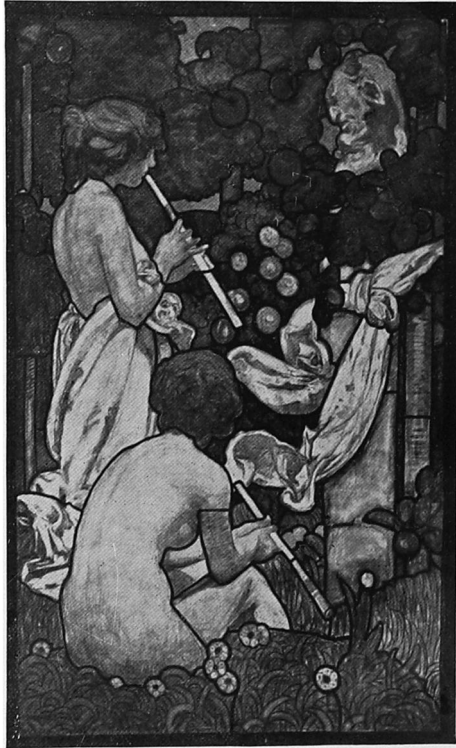
In depicting the human countenance, however, the features must be painted on the glass with mineral paint and then fired. Here again the stained-glass worker experiences a difficulty unknown to the ordinary painter, since firing changes most colors perceptibly. The artist, therefore, must know what the probable effect of the firing will be, and make due allowance for the change in painting his picture. Various other disturbing elements have to be considered. The distance of the window from the spectator, the presence of contiguous buildings which affect the light, the conformity of the internal arrangements of the building, and many another factor have to receive careful attention if the stained-glass worker realizes in his finished picture even approximately the conceptions and the fine detail embodied in the preliminary sketch.

The design must be positively outlined, the shadings must be

vigorous and pronounced, and the expressions on the painted faces must, in a sense, be judiciously exaggerated, or when the window is placed in position so that the transmitted light reaches the eye of the beholder, the whole composition will seem weak and confused. A composition that gives an admirable effect near by often loses its charm when the spectator is a hundred feet or so away. Modern blues and purples especially are apt to look muddy and obscure at a distance.

The use of enamel or mineral paint likewise has its dangers and difficulties. "No one but a master of both drawing and color," said a writer in discussing this branch of the work, "can hope to use it advantageously. Every touch of the brush dulls the color of the pot-metal in modifying it; and if large unpainted spaces are not reversed, the work is ruined. On the other hand, if the painted and unpainted portions are not made to balance and sustain one another, the work is equally ruined. The firing of the enamel is as delicate and risky a process as any used in the arts. . . . A practical acquaintance with all the work of the glass-house is as essential as the artist's skill and judgment in the designing, and without both the best work in this style cannot be produced."

It is scarcely practicable in a popular article to go more minutely into details. An outline of the processes used must suffice. Stained-glass work is one of the arts in which by a happy chance the first masters hit upon the true principles, and the best results of modern



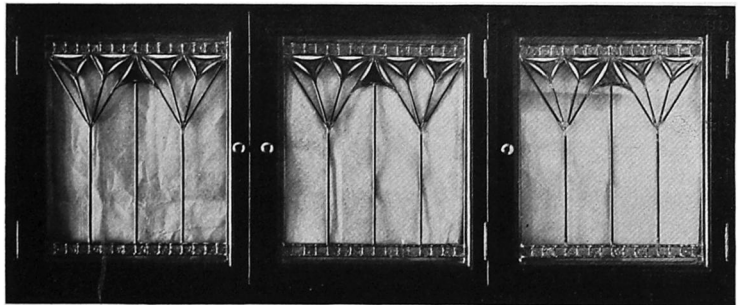
STAINED-GLASS WINDOW
By Louis C. Tiffany

times have been achieved by going back to these first principles. It is to the credit of the American workers in the field that if they were not pioneers in this movement, they have, at least, by their cleverness, persistence, and good taste, done more to revive the art than have European workers in the same line.

A comparatively small amount of the glass used in the best work to-day in America is imported; our own manufacturers are producing satisfactory material. In point of design, moreover, the progress is no less marked. Our artists to-day are not limited to geometrical designs and saintly figures. It was long a mooted point, for instance, whether landscapes were permissible in stained glass, but this question has been settled affirmatively by American stained-glass workers, and bits of charming scenery have been successfully produced. The illustrations accompanying this article will give a hint of the possibilities of this old art in its revived form.

In conclusion, a word should be said of the latest novelty in point of method in stained-glass work—the abolishment of the heavy lead lines once universally used. By this new method the pieces of glass are put in position with nothing but thin strips of sheet copper between them to form the connecting link. The whole is then subjected to a copper bath, and galvanic action welds together, if one may use the term, the little strips of copper, fills in the spaces between them and the glass with metal deposit, and forms over the edges of the glass a little shoulder of copper sufficient to unite the composition into practically a solid pane without at the same time making the copper bands sufficiently conspicuous to mar the beauty of the design. Most ornamental-glass workers to-day still cling to the lead strips and the soldering-iron, and the majority may continue to do so for years to come. Mention is made here of the use of copper as a connecting medium chiefly because it is the latest and most novel innovation in the art.

KIRK D. HENRY.



SIMPLE WINDOW DESIGN

By Richard E. Schmidt